Check the two conditions of (acronymref/definition/LT) 443

revise las dos condiciones del (acronymref/definition/LT) 443

$$\begin{aligned}
\mathrm{T}\ (\mathrm{u}+\mathrm{v}) &= \mathrm{T}((\mathrm{a}+\mathrm{bx}+\mathrm{cx}^2)+(\mathrm{d}+\mathrm{ex}+\mathrm{fx}^2)) \\
&= \mathrm{T}\ ((\mathrm{a}+\mathrm{d})+(\mathrm{b}+\mathrm{d})\mathrm{x}+(\mathrm{c}+\mathrm{f}\ )\mathrm{x}^2) \\
&= \begin{pmatrix} 2(a+d)-(b+d) \\ (b+e)+(c+f) \end{pmatrix} \\
&= \begin{pmatrix} (2a-b)+(2d-e) \\ (b+c)+(e+f) \end{pmatrix} \\
&= \begin{pmatrix} 2a-b \\ b+a \end{pmatrix} + \begin{pmatrix} 2d-e \\ e+f \end{pmatrix} \\
&= \mathrm{T}\ (\mathrm{u})+\mathrm{T}\ (\mathrm{v})
\end{aligned}$$

$$\begin{aligned}
\mathrm{T}\ (\alpha u) &= \mathrm{T}(\alpha(\alpha+\mathrm{bx}+\mathrm{cx}^2) \\
&= \mathrm{T}\ ((\ \alpha a)+(\alpha b)x+(\mathrm{ac})x^2 \\
&= \begin{pmatrix} 2(\alpha a)-(a b) \\ (a b)+(a c) \end{pmatrix} \\
&= \begin{pmatrix} \alpha(2a-b \\ \alpha(a+b) \end{pmatrix} \\
&= \begin{pmatrix} 2a-b \\ b+c \end{pmatrix} \\
&= \alpha T(u)
\end{aligned}$$

so T is indeed a linar transformation.

por lo tanto T es efectivamente una transformacion lineal